Claims

[c1] 1. A method for decreasing gradient field pulse sequence duration and reducing peripheral nerve stimulation with known gradient pulse areas for a magnetic resonance imaging system, the method comprising:
receiving a first desired area corresponding to a first pulse;
obtaining a second desired area corresponding to a second pulse;
selecting said first pulse as a nested pulse if said first desired area is smaller than said second desired area, and establishing said second pulse as a nesting pulse, otherwise selecting said second pulse as said nested pulse and establishing said first pulse as said nesting pulse;
determining an amplitude and pulse duration for said nested pulse;
ascertaining an amplitude and pulse duration for said nesting pulse; and
arranging a plurality of gradient field pulse sequences to include said nested pulse and said nesting pulse.

[c2] 2. The method of Claim 1 wherein said determining further comprises:
establishing if said nested pulse is triangular or trapezoidal and establishing a flat top time for said nested pulse if it is trapezoidal; and
calculating said amplitude a ramp time for said nested pulse.

[c3] 3. The method of Claim 1 wherein said calculating comprises:
setting a first duration corresponding to said nested pulse equivalent to about a second duration corresponding to a flattop portion of said nesting pulse; and
calculating said amplitude a ramp time for said nesting pulse.

[c4] 4. The method of Claim 1 wherein said first pulse is a slice select rephaser pulse and said second pulse is a readout prephaser pulse.

[c5] 5. The method of Claim 1 wherein said first pulse is a readout prephaser pulse and said second pulse is a slice select rephaser pulse.

[c6] 6. The method of Claim 1 wherein said plurality of gradient field pulse sequences includes a slice select pulse sequence, a phase encoding pulse sequence and a readout pulse sequence.

[c7] 7. The method of Claim 6 wherein: said slice select pulse sequence comprises a

slice select pulse, a slice select rephaser pulse and a slice select dephaser pulse; said phase encoding pulse sequence includes a phase encoding pulse and a phase encoding rewinder pulse; and said readout pulse sequence includes a readout prephaser pulse, a readout pulse and a readout dephaser pulse.

[c8] 8. The method of Claim 7 wherein said slice select dephaser pulse is configured to be about equivalent to said slice select rephaser pulse.

[c9] 9. The method of Claim 7 wherein said phase encoding rewinder pulse is configured to be about equivalent to said phase encoding pulse but of opposite sign.

[c10] 10. The method of Claim 7 wherein said readout dephaser pulse is configured to be about equivalent to said readout prephaser pulse.

[c11] 11. The method of Claim 1 further including determining an amplitude and duration for a slice select pulse and a readout pulse responsive to a desired area for said slice select pulse and another desired area for said readout pulse.

[c12] 12. The method of Claim 11 wherein said arranging includes configuring said plurality of gradient field pulse sequences to reduce a gradient field pulse sequence duration and maintain established magnetic field constraints.

[c13] 13. The method of Claim 1 further including a third desired area corresponding to a third pulse, wherein said plurality of gradient field pulse sequences includes an initial slew of said third pulse which is occurs during a non-slewing portion of said nested pulse.

[c14] 14. The method of Claim 13 further including computing an amplitude and duration of said third pulse responsive to said third desired area.

[c15] 15. The method of Claim 14 wherein said computing comprises:
establishing if said third pulse is triangular or trapezoidal and establishing a flat top time for said third pulse if it is trapezoidal; and
calculating said amplitude a ramp time for said third pulse.

[c16] 16. The method of Claim 13 said third pulse is a phase encoding pulse.

[c17] 17. A system for decreasing gradient field pulse sequence duration and reducing peripheral nerve stimulation with known gradient pulse areas in a magnetic resonance imaging system, comprising:
a magnetic resonance imaging system including system control configured to implement a method comprising:
receiving a first desired area corresponding to a first pulse;
obtaining a second desired area corresponding to a second pulse;
selecting said first pulse as a nested pulse if said first desired area is smaller than said second desired area, and establishing said second pulse as a nesting pulse, otherwise selecting said second pulse as said nested pulse and establishing said first pulse as said nesting pulse;
determining an amplitude and pulse duration for said nested pulse;
ascertaining an amplitude and pulse duration for said nesting pulse; and
arranging a plurality of gradient field pulse sequences to include said nested pulse and said nesting pulse.

[c18] 18. The system of Claim 17 wherein said determining further comprises:
establishing if said nested pulse is triangular or trapezoidal and establishing a flat top time for said nested pulse if it is trapezoidal; and
calculating said amplitude a ramp time for said nested pulse.

[c19] 19. The system of Claim 17 wherein said calculating comprises:
setting a first duration corresponding to said nested pulse equivalent to about a second duration corresponding to a flattop portion of said nesting pulse; and
calculating said amplitude a ramp time for said nesting pulse.

[c20] 20. The system of Claim 17 wherein said first pulse is a slice select rephaser pulse and said second pulse is a readout prephaser pulse.

[c21] 21. The system of Claim 17 wherein said first pulse is a readout prephaser pulse and said second pulse is a slice select rephaser pulse.

[c22] 22. The system of Claim 17 wherein said plurality of gradient field pulse sequences includes a slice select pulse sequence, a phase encoding pulse sequence and a readout pulse sequence.

[c23] 23. The system of Claim 22 wherein: said slice select pulse sequence comprises a slice select pulse, a slice select rephaser pulse and a slice select dephaser pulse; said phase encoding pulse sequence includes a phase encoding pulse and a phase encoding rewinder pulse; and said readout pulse sequence includes a readout prephaser pulse, a readout pulse and a readout dephaser pulse.

[c24] 24. The method of Claim 23 wherein said slice select dephaser pulse is configured to be about equivalent to said slice select rephaser pulse.

[c25] 25. The method of Claim 23 wherein said phase encoding rewinder pulse is configured to be about equivalent to said phase encoding pulse but of opposite sign.

[c26] 26. The system of Claim 23 wherein said readout dephaser pulse is configured to be about equivalent to said readout prephaser pulse.

[c27] 27. The system of Claim 17 further including determining an amplitude and duration for a slice select pulse and a readout pulse responsive to a desired area for said slice select pulse and another desired area for said readout pulse.

[c28] 28. The system of Claim 27 wherein said arranging includes configuring said plurality of gradient field pulse sequences to reduce a gradient field pulse sequence duration and maintain established magnetic field constraints.

[c29] 29. The system of Claim 17 further including a third desired area corresponding to a third pulse, wherein said plurality of gradient field pulse sequences includes an initial slew of said third pulse which is occurs during a non-slewing portion of said nested pulse.

[c30] 30. The system of Claim 29 further including computing an amplitude and duration of said third pulse responsive to said third desired area.

[c31] 31. The system of Claim 30 wherein said computing comprises:
establishing if said third pulse is triangular or trapezoidal and establishing a flat top time for said third pulse if it is trapezoidal; and
calculating said amplitude a ramp time for said third pulse.

[c32] 32. The system of Claim 29 said third pulse is a phase encoding pulse.

[c33] 33. A storage medium encoded with a machine-readable computer program code;

said code including instructions for causing a computer to implement a method for decreasing gradient field pulse sequence duration and reducing peripheral nerve stimulation with known gradient pulse areas for a magnetic resonance imaging system, the method comprising:

receiving a first desired area corresponding to a first pulse;

obtaining a second desired area corresponding to a second pulse;

selecting said first pulse as a nested pulse if said first desired area is smaller than said second desired area, and establishing said second pulse as a nesting pulse, otherwise selecting said second pulse as said nested pulse and establishing said first pulse as said nesting pulse;

determining an amplitude and pulse duration for said nested pulse;

ascertaining an amplitude and pulse duration for said nesting pulse; and

arranging a plurality of gradient field pulse sequences to include said nested pulse and said nesting pulse.

[c34] 34. A computer data signal comprising code configured to cause a processor to implement a method for decreasing gradient field pulse sequence duration and reducing peripheral nerve stimulation with known gradient pulse areas in a magnetic resonance imaging system, the method comprising:

receiving a first desired area corresponding to a first pulse;

obtaining a second desired area corresponding to a second pulse;

selecting said first pulse as a nested pulse if said first desired area is smaller than said second desired area, and establishing said second pulse as a nesting pulse, otherwise selecting said second pulse as said nested pulse and establishing said first pulse as said nesting pulse;

determining an amplitude and pulse duration for said nested pulse;

ascertaining an amplitude and pulse duration for said nesting pulse; and

arranging a plurality of gradient field pulse sequences to include said nested pulse and said nesting pulse.

[c35] 35. A means for decreasing gradient field pulse sequence duration and reducing peripheral nerve stimulation with known gradient pulse areas for a magnetic resonance imaging system, the method comprising:

a means for receiving a first desired area corresponding to a first pulse;

a means for obtaining a second desired area corresponding to a second pulse;

a means for selecting said first pulse as a nested pulse if said first desired area is smaller than said second desired area, and establishing said second pulse as a nesting pulse, otherwise selecting said second pulse as said nested pulse and establishing said first pulse as said nesting pulse;

a means for determining an amplitude and pulse duration for said nested pulse;

a means for ascertaining an amplitude and pulse duration for said nesting pulse; and

a means for arranging a plurality of gradient field pulse sequences to include said nested pulse and said nesting pulse.

[c36] 36. A method for nesting gradient pulses in gradient field pulse sequences with known gradient pulse areas for a magnetic resonance imaging system, comprising:

receiving a slice select rephaser pulse desired area indicative of a desired area for a slice select rephaser pulse;

receiving a readout prephaser pulse desired area indicative of a desired area for a readout prephaser pulse;

selecting said slice select rephaser pulse as a nested pulse if said slice select rephaser pulse desired area is smaller than said readout prephaser pulse desired area, and establishing said readout prephaser pulse as a nesting pulse, otherwise selecting said readout prephaser pulse as said nested pulse and establishing said slice select rephaser pulse as said nesting pulse;

determining an amplitude and pulse duration for said nested pulse;

determining an amplitude and pulse duration for said nesting pulse; and

arranging a plurality of gradient field pulse sequences to include said nested pulse and said nesting pulse in a manner that minimizes concurrent slews of any gradient field.